CHAPTER 2 - ALTERNATIVES, INCLUDING THE PROPOSED ACTION

The purpose of this chapter is to provide a detailed description of the Proposed Action and of alternatives to the Proposed Action, including the No Action Alternative required by NEPA. This chapter explains and quantifies the levels of disturbance that would affect the Project Area for each of the alternatives considered. The disturbance levels determined for each alternative are then used in the environmental consequences portion of Chapter 3 to quantify effects to individual resources. The amount and kind of disturbance are then considered by the Decision Maker during the decision process.

This chapter also provides a summary of mitigation measures which have been incorporated into the Proposed Action or alternatives. Mitigation measures are measures that can be implemented to lessen the impacts to resources given an action. Mitigation can include:

- avoidance of the impact altogether by not taking the action or parts of the action;
- minimizing impacts by limiting the degree or magnitude of the action;
- rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
- reducing or eliminating the impact over time by preservation and maintenance operations, and compensating for the impact by replacement or substitution of a resource or environment.

This chapter also discusses procedures for monitoring potential effects to resources within the Project Area resulting from development of the Proposed Action or an alternative. Monitoring is a way of overseeing construction and implementation of the Project as evidence that conditions of approval, stipulations, and mitigation are carried out by the Proponent. Monitoring is also conducted for the long term to verify that implementation of those requirements has achieved or will achieve the desired goals of the Project. Monitoring is generally an obligation of USFS employees or other delegated representatives; however, this task can be made an obligation of the Proponent under special circumstances.

Two alternatives have been considered in this EA:

1. The Proposed Action, including the drilling of 182 CBM wells on federal lands and minerals and construction of ancillary production facilities.

2. The No Action Alternative, which would preclude development of the Proposed Action as described. CBM development would likely continue on private and state mineral estates within portions of, and surrounding, the Project Area. Drainage of federal minerals and consequent loss of royalties to the United States would continue. The ability of the decision-maker to select the No Action Alternative is severely constrained. Consideration of the No Action Alternative is required by NEPA.

Alternatives are required for a proper NEPA analysis (40 CFR 1502.14), but alternatives must be "reasonable" and must accommodate the purpose and need of the project. Alternatives must be technically and economically feasible (CEQ Forty Questions, 2a). Alternatives should explore the range of potential issues and thus alternatives development is strongly influenced by the results of the scoping process.

For the Project considered in this EA, the Company and the USFS have identified issues of concern and appropriate mitigative measures. The Company is committed to the application of these mitigation measures in the interest of minimizing potential impacts from the Proposed Action. In consequence of this commitment, no additional issues-driven alternative to the Proposed Action has been identified.

Alternatives considered but not analyzed in detail are also identified and discussed in this chapter.

2.1 PROPOSED ACTION

The Company proposes to drill, complete, operate, and reclaim 226 CBM wells from the Fort Union Wyodak Coal reservoir in the Project Area. As discussed in Chapter 1, the Proposed Action in this EA is a smaller project than that discussed in the Scoping Statement. The Project Area comprises approximately 17,940 acres in Townships 41 and 42 North, Ranges 70 and 71 West, Campbell County, Wyoming. Under the Proposed Action, approximately 127 wells would be spaced at one well per 80 acres. Spacing of approximately 99 wells near the existing coal mines would be one well per 40 acres. Productive well life is estimated to range from 4 to 7 years. Average approximate depth of these wells would be 400 to 500 feet.

As is typical of most oil and gas projects, the Big Porcupine CBM Project has evolved over time. The number of wells included in the Proposed Action is less than the 453 wells discussed in the Project scoping statement, mailed February 25, 2002. At the time of scoping, the Project was proposed by Independent Production Company (IPC). Subsequently, and prior to onsite inspections in the summer of 2002, IPC changed the proposed well spacing for most of the Project Area from 40 acres to 80 acres. In May 2003, IPC and the Big Porcupine Project were acquired by the Company.

The western portion of the original Project Area was located on both private surface overlying private minerals and private surface overlying federal minerals. Federal wells in this area are under the jurisdiction of the BLM, not the USFS. This portion of the original Project Area, termed the Porcupine POD, also included acreage acquired by the Company subsequent to the issuance of the Project scoping notice. In July, 2003, the Porcupine POD, comprising 29 well locations on private surface overlying federal minerals, was submitted to the BLM for approval. Approval to develop this POD was received from the BLM by the Company in January 2004. NEPA analysis for the Porcupine POD was conducted by the BLM and those wells have been excluded from this EA.

Finally, since issuance of the Draft EA, the Company has decided to drop six federal wells from the Proposed Action for operational reasons. The removal of these wells represents a reduction

of approximately 2.5 percent of the surface disturbances associated directly with well locations. In the interest of simplicity, it was decided not to recompute all of the disturbance levels based upon this small reduction in the total well count, although the actual number of wells has been corrected in this Final EA. The reader may assume that actual disturbances will, in many cases, be slightly less than the values indicated in the various tables.

Surface and mineral ownership of the proposed wells would be divided among the United States, State of Wyoming, and private land owners, as indicated in **Table 1-2**. Approximately 156 wells would be located on federal surface belonging to the USFS and minerals administered by the BLM. An additional 27 wells would be drilled on split estate situations with either private or State of Wyoming surface overlying federal minerals administered by the BLM. The total number of federal wells considered by this EA is 182.

State of Wyoming surface would contain 18 wells, including 8 drilled to federal minerals. Private surface would contain 53 wells, including 18 drilled to federal minerals and 3 to State of Wyoming minerals.

As previously discussed, the Proposed Action was designed as a unity and, because of its size, overlaps lands of the USFS, State of Wyoming, and private surface jurisdictions. The 44 wells discussed in this EA which are outside of federal jurisdiction are termed "associated" wells. While analysis for these wells has been included in this EA, the Company has the right and intention to proceed with development of associated wells, where possible, independently of any federal decisions on the Proposed Action.

The Company would also construct ancillary facilities needed to support these wells. These facilities include access roads, small diameter pipelines for collecting gas and produced water, electrical utilities, facilities for compressing gas, facilities for discharging produced water, and larger diameter pipelines for delivering gas to a higher-pressure gas collection system and ultimately to a transmission pipeline. This transmission pipeline would deliver the gas to market. One test well was previously drilled on Project acreage in 1999, completed, and shut in (SENE Section 16, T42N, R70W).

Implementation of the Proposed Action would occur in three primary phases:

1. Drilling and construction of facilities,
2. Production and maintenance, and
3. Decommissioning and reclamation.

Each of these phases will be discussed separately.

2.1.1 Drilling of Wells and Construction of Production Facilities

2.1.1.1 Well Access Roads

Access to wells and facilities would be via:

1. Existing roads included in the USFS Roads System,
2. Existing roads not included in the USFS Roads System ("undetermined" roads), and
3. New construction on both USFS and private surface.

The traffic corridor for most Project roads would typically be 12 feet wide, with a maximum 25-foot width brush-hogged ROW, marked by flagging material. Flat blading and turnouts would generally not be required, except as noted in on-site inspections previously completed in conjunction with the USFS for each well. Low traffic volumes and the light equipment required to service most CBM wells minimize the requirements for road upgrading. Any need for surfacing would be determined in consultation with the USFS based on site-specific conditions. If the well were completed, the access road would be maintained as necessary to prevent soil erosion and accommodate year-round use. Existing gates would be used where practical and additional gates and cattleguards would be installed where necessary or at landowner request. Roads to unsuccessful wells would be reclaimed as soon as practical. Grading and surfacing would be required for roads accessing compressor stations.

Unless upgrading is needed to alleviate concerns about safety or access difficulties, the Company would maintain roads used to access well sites in a two-track status to minimize disturbance. Areas where upgrading may be needed include stream drainage crossings, low-water crossings, and areas of rough topography. Gravel or scoria may be applied to soft, rut-prone areas. Travel on two-track roads would be rescheduled or postponed during infrequent periods of wet weather when vehicular traffic could cause rutting.

Constructed roads not needed for USFS purposes would be reclaimed at the end of the Project. Decisions regarding roads reclamation are based upon a Roads Analysis Process conducted per applicable USFS regulations (USFS, 1999). To assist in that process, a Proposed Transportation Plan (Independent Production Company, 2003), based upon the Proposed Action as it existed in early 2003, has been prepared. Analyses of specific road mileages in this EA differ from those in the Proposed Transportation Plan because of the removal of the Porcupine POD acreage from the Proposed Action, as discussed in Chapter 1. Road disturbances resulting from the Proposed Action are summarized in **Table 2-**1 and **Table 2-**2. A summary of the Roads Analysis Process conducted for the Proposed Action has been included as **Appendix M.**

Project road construction would allow the USFS to close and reclaim an undetermined mileage of existing roads. The distribution of proposed roads and existing roads is indicated on **Figure 2-1, Project Roads Maps**.

Table 2-1 Road Mileage Summary, Proposed Action

Category	Surface Estate	Length (Meters)	Length (Miles)
Existing Roads	Federal	151,488	94.11
	State	10,380	6.45
	Private	36,289	19.91
	Total	*193,868*	*120.47*
Access via Existing Roads	Federal	86,772	53.92
	State	7,837	4.87
	Private	22,707	14.11

Category	Surface Estate	Length (Meters)	Length (Miles)
	Total	*117,315*	*72.90*
Proposed New Roads	Federal	36,630	22.76
	State	7,068	4.39
	Private	19,633	12.20
	Total	*63,389*	*39.39*
Proposed Upgrades to Existing Roads	Federal	1,609	1.00
	State	0	0.00
	Private	338	0.21
	Total	1,947	1.21
Total Proposed Access, Upgrades, and New Roads	Federal	125,008	77.68
	State	14,902	9.26
	Private	42,742	26.56
	Total	*182,652*	*113.50*

***** Access roads will utilize Forest Service System classified or non-Forest Service System undetermined existing roads. Rounding issues may affect table totals.

Table 2-2 Summary of Road Construction Disturbance, Proposed Action

Category	Surface Estate	Right-of-Way (Feet)	Length (Meters)	Length (Feet)	Length (Miles)	Disturbance (Acres)
Upgrade to Oilfield 2	Federal	60	1,520	4,987	0.94	6.87
New Oilfield 2			90	295	0.06	0.41
New 2-Track		12	36,630	120,183	22.76	33.11
Subtotals - Federal			*38,240*	*125,465*	*23.76*	*40.38*
Upgrade to Oilfield 2	State	60	0	0	0.00	0.00
New Oilfield 2			0	0	0.00	0.00
New 2-Track		12	7,068	23,190	4.39	6.39
Subtotals - State			*7,068*	*23,190*	*4.39*	*6.39*
Upgrade to Oilfield 2	Private	60	335	1,099	0.21	1.51
New Oilfield 2			0	0	0.00	0.00
New 2-Track		12	19,629	64,403	12.20	17.74
Subtotals - Private			*19,964*	*65,502*	*12.41*	*19.26*
Grand Totals			65,272	214,157	40.56	66.03

Oilfield 2-class roads are crowned, ditched, and graveled. Rounding issues may affect table totals.

2.1.1.2 Well Sites

Construction activities at well sites would be kept to a minimum to limit disturbance to vegetation and underlying soils. At level well locations, only small amounts of vegetation would be mowed or cleared. At each drill site, a temporary mud/reserve pit approximately 4 to 6 feet deep, 10 feet wide and up to 20 feet long would be excavated, to be used during drilling and completion operations. The pit would be lined if so specified by the regulatory authority or by the surface owner. The pit would be allowed to dry sufficiently long enough to evaporate the water and the liner, if present, would be ripped before being backfilled and covered. Cuttings and mud would be buried approximately 3 feet and no surface depression would ultimately remain. Following well completion, portions of the well site that are not needed for surface production activities would be reclaimed. Completion of revegetation and reclamation of the site

would be expected to be completed within six months of commencement of drilling the well, weather permitting.

In areas where the surface of the ground is too steep to allow a drill rig to set up over native ground, the Company would use limited cut and fill construction techniques to level a work area. The Company estimates that cut and fill procedures may be required approximately 5 percent of the time. Areas disturbed, but not needed for production, would be reclaimed as soon as practical after the conclusion of drilling.

The area that would initially be subject to traffic at well sites would typically be approximately 150 x 150 feet (0.52 acres) with the rig layout area occupying approximately 50 x 60 feet (0.07 acres) within the overall disturbance. Following well completion, portions of the well site that were not needed for production equipment and activities would be reclaimed. Over the long term, the size of well sites would be reduced to a minimum of about 0.13 acre (75 x 75 feet). The latter would include a small area occupied by a well housing structure and a turn-around road around the well housing.

2.1.1.3 Drilling and Completion

Upon completion of the access road and preparation of the well site, a truck-mounted water well drill rig would be driven to the site and erected. Additional equipment and materials needed for drilling operations, including water, would be trucked to the site. Basin-wide statistics suggest that drilling would require about 26,000 gallons (0.08 acre-feet) of water per well for preparing cement, stimulating the well, controlling dust, and drilling (BLM, 2003, p. 2-22). Drilling fluid is typically water. Non-toxic drilling mud may be required to handle certain down-hole conditions. Drilling mud would consist of native mud (i.e., soils encountered by the bore hole) and possibly bentonite in the event loss of drilling fluid circulation is encountered. Holes are typically cleaned with the addition of approximately 3 gallons of a non-toxic hydrolyzed polyacrylamide/polyacrylate polymer mud additive, such as EZ-Mud.

Routine drilling operations normally include:

1. Keeping a sharp bit on bottom to penetrate the subsurface,
2. Circulating drilling fluids to lubricate the bit and flush pieces of drilled rock from the hole,
3. Adding new joints of pipe at the surface as the hole deepens,
4. Removing the drill string from the hole to install a new bit and running the drill pipe back to the bottom, and
5. Installing and cementing casing.

Figure 2-1-1 Project Roads Maps

Figure 2-1-2 Project Roads Maps

Figure 2-1-3 Project Roads Maps

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Surface casing is installed to protect fresh water aquifers and is required by regulations of the BLM and the WOGCC. Each well would be drilled in approximately three days.

The Fort Union Wyodak coal reservoir pressure in the Project Area is below normal freshwater gradient. The well pressure control system is designed to meet the conditions likely to be encountered in the hole and would be in conformance with the requirements of the BLM and WOGCC. A diverter (rubber pack-off type pressure control device commonly used on water rigs) would be utilized for pressure control after the surface casing has been set. A venting line would extend from the diverter, a minimum of 30 feet from the well bore.

The WOGCC and BLM currently require (under Federal Onshore Oil and Gas Order No. 2 and WOGCC's drilling rules located in Section 22 of Chapter 3) that surface casing of 60 feet or 10 percent of the total depth of the well be set with cement returns to surface. Individual wells would be drilled as follows:

- A hole would be drilled to either 60 feet or 10 percent of the total depth if greater than 600 feet using a 12 ¼-inch or larger drill bit.
- 9 5/8-inch outside diameter (O.D.) or larger surface casing (typically 10 ¾-inch O.D.) would be set at that depth and cemented back to surface.
- The well would be drilled out to the top of the Wyodak coal using an 8 ¾-inch or larger (9 7/8-inch is typical) drill bit.
- 7-inch O.D. production casing would be run and cemented to surface.

Steel casing would be placed into the well bore one piece of pipe at a time. Each piece would be threaded on both ends, with a casing collar located at one end to connect each piece. Casing would be cemented into place by pumping a slurry of cement and water into the casing head, down through the casing to the bottom and then up through the space between the casing and the well bore (annulus). A plug and water flush would then be pumped to the bottom of the well down through the inside of the casing to the bottom of the well to remove any residual cement from inside walls of the casing. Sufficient cement would be pumped into the annulus to fill the space between the casing and the rock, where it would be allowed to harden before proceeding with the completion process.

The production casing cement procedure would be designed to circulate cement to the surface with 100 percent coverage of the formations penetrated by the well bore plus an additional 25 percent to account for infiltration of cement into formations at the base of the well bore. The cement in the base of the production casing would not be drilled out prior to achieving a minimum 500 pounds per square inch (psi) compressive strength.

If inadequate cementing of the surface or intermediate casing is indicated, such as by loss of circulated fluid, cement channeling or mechanical failure of equipment, the Company would evaluate the adequacy of the cementing operations by pressure testing the casing shoe (the base of the casing), running a cement bond log, or a combination of methods. Cementing the annulus around the casing pipe restores the original isolation of formations by creating a barrier to the vertical migration of fluids and gas between rock formations within the borehole. It also protects

the well by preventing pressure in the formation from damaging the casing and retards corrosion by minimizing contact between the casing and any potentially corrosive formation waters.

The Wyodak coal beneath the production casing would be drilled with a 6 ¼-inch or 6 3/8-inch bit using air-foam as the drilling fluid. The coal would be logged with a gamma-ray casing collar locator log. After logging, the Company would enlarge the size of the hole in the coal below the 7-inch casing using a specialty bit with expandable cutting surfaces to open the hole bored in the coal to a size of 10 to 12 inches. The well would be completed without inserting additional steel casing.

Completion operations would take an estimated two days. After the coal is drilled, the open hole may be flushed with clean water, typically obtained from another producing CBM well, to remove coal fines from the hole. Steel tubing would then be inserted inside the casing and into the open hole. An electric submersible pump would be attached to the bottom end of the tubing to pump water from the coal. The size and capacity of the submersible pump would depend on the coal's thickness, depth, and anticipated rate of water production. Most pumps are rated at 10 to 20 gallons per minute (gpm) but smaller or larger pumps may be installed based upon the individual well's capacity to produce. The pump is installed because water pressure in the coal zone must be reduced before methane gas would flow to the open hole. As the pressure drops, the gas is released from the coal and flows up the space between the tubing and the steel casing to the gas collection system at the surface. The gas would be transmitted through a variety of collection lines to compressor stations and ultimately, via a sales line, to downstream markets.

Small amounts of gas may be produced in the initial stages of de-pressuring the coalbed. This gas may be vented until sufficient volumes are produced to operate a natural gas-fueled compressor. Any venting would be done according to the BLM's Notice to Lessees 4A (Royalty or Compensation for Oil and Gas Lost) and Onshore Order No. 5 (Measurement of Gas) and by permission of the WOGCC. Immediately upon reaching a volume capable of sustaining compression operations, the wells producing gas would be shut in until the necessary pipeline connections could be made to sell the gas. The Company anticipates that most wells will produce natural gas within several weeks of placing the wells in production.

When the well has been completed, all disturbed areas that are not needed for production facilities would be restored. These areas would be seeded as soon as practical, typically within six months of commencing the well. Wells determined to be unsuccessful would be plugged, abandoned, and then reclaimed as soon as practical. Reclamation would be completed according to BLM and/or USFS regulations and the agreement of the surface owner.

2.1.1.4 Well Production Facilities

After well productivity is established, a weatherproof shelter called a well house would be placed on the leveled surface over the wellhead. The well house is approximately 6 feet long x 8 feet wide x 6.5 feet tall. An electrical panel and associated well automation and telemetry equipment would be located adjacent to the well house. The well house would be vented. Meters to measure pressure and rates of water and gas flowing from the well would be placed inside the

wellhead shelter. There would be no pumping units (pump jacks) at the well location. Low-voltage (480 volt) secondary electric power lines for the submersible water pump would be buried in trenches, usually with the water and gas pipelines, to form a common utility corridor.

2.1.1.5 Pipelines

Four types of pipelines would be constructed or used within and adjacent to the Project Area:

1. Low-pressure gas pipelines,
2. Produced water pipelines,
3. High pressure gas collector system pipelines, and
4. High pressure gas sales pipeline.

The low-pressure gas collection and produced water gathering pipelines would transport gas and produced water from the wells to first stage compressor facilities and produced water discharge or disposal points, respectively. The high-pressure gas collector pipelines would connect first stage compressor facilities to a second and third stage compressor facility located in the northwestern portion of the Project Area in NENWSE of Section 23, T42N, R71W, as indicated on **Figure 2-2, Project Facilities Maps**. At this facility, one or more compressors would raise the pressure of gas from all project wells to a level sufficient for transport via a high pressure sales transmission line. Gas from the Project Area would be connected to an existing 12-inch O.D. steel lateral pipeline for delivery to the existing McCulloch Interstate Gas Company (MIGC) 16-inch transmission line. The second and third stage compressor site would be located immediately adjacent to the MIGC line.

Low Pressure Pipelines

Low-pressure gas lines from individual wells would typically be 3- to 4-inch O.D. pipe that would merge into 8 to 12-inch polyethylene trunk lines, terminating at the first stage compressor stations. Local collector structures used in some CBM projects, known as POD buildings, would not be constructed. Typical pressures in gas collection lines would be less than 50 psi. Approximately 14 miles of collection lines separate from common utility corridors would be installed on federal surface, one mile on State of Wyoming surface, and 2.5 miles on private surface. The width of the ROW for gas gathering lines would be 50 feet. Disturbed acreages corresponding to the pipeline mileage would be approximately 85 on federal surface, six on State of Wyoming surface, and 15 on private surface.

Produced water gathering pipelines would transport produced water from the wells to discharge locations. Produced water pipelines would be constructed of polyethylene pipe with an O.D. of two to four inches. Approximately 13.3 miles of produced water pipelines separate from common utility corridors would be installed on federal surface, 1.1 miles on state surface, and 4.2 miles on private surface. The width of the ROW for produced water pipelines would be 50 feet. Disturbed acreages corresponding to the pipeline mileage would be approximately 81 acres on federal surface, seven on state surface, and 25 acres on private surface.

In addition, common utility corridors, containing produced water and low pressure gas pipelines and buried electrical cables, would extend over approximately 45.5 miles of federal surface, 6.4 miles of State of Wyoming surface, and 13.8 miles of private surface. Corresponding maximum disturbed acreage would be approximately 276 acres for federal surface, 39 acres for State of Wyoming surface, and 84 acres for private surface.

High-Pressure Pipelines

The high-pressure collector pipelines that transport gas from the first stage compressor stations to the second and third stage compressor station would be constructed of steel pipe with an O.D. of eight to 16 inches. Typical pressures in high-pressure collector pipelines would be approximately 125 psi. Construction of the high-pressure collector pipelines is expected to last approximately 80 days.

Approximately 6.5 miles of high pressure pipelines would be installed on federal surface, 0.5 mile on State of Wyoming surface, and 3.5 miles on private surface. High-pressure pipelines would be installed in a separate ditch, adjacent to the ROW of the low-pressure lines wherever possible. The width of the ROW for high-pressure collector pipelines would be 80 feet. Disturbed acreages corresponding to the pipeline mileage would be approximately 63 acres on federal surface, five on State of Wyoming surface, and 33 acres on private surface. At the second and third stage compressor station, gas pressures would be boosted sufficiently for interstate transmission through the high pressure sales pipeline. The sales line is an existing line and would connect to the second and third stage compressor station on private surface.

All three types of pipelines would be installed in ROWs along access roads, wherever practical. The water and low pressure gas pipelines would be mostly co-located in common utility corridors to minimize disturbance, except where topography or concerns of surface owners dictate otherwise. ROW Special Use Permits are granted for various Project pipelines by the USFS. Traffic and disturbance must be confined to the ROW and disturbance can be considerably less than the ROW width.

The total length of all of the pipeline corridors is approximately 112.4 miles, including 101.9 miles at a ROW width of 50 feet and 10.5 miles at a ROW width of 80 feet. Maximum total disturbance for the pipeline corridors is thus approximately 719.5 acres, although actual excavation disturbance would normally be significantly less. A summary of disturbance associated with Project pipelines is indicated in **Table 2-3**.

Figure 2-2-1 Project Facilities Map

Figure 2-2-2 Project Facilities Map

Figure 2-2-3 Project Facilities Map

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Table 2-3 Summary of Pipeline Disturbance, Proposed Action

Facility	Surface Ownership	Length (Meters)	Length (Feet)	Length (Miles)	ROW (Feet)	Maximum Disturbance (Acres)
Separate Water Collection Lines (2 to 4 inch Polyethylene)	Federal	21,377	70,139	13.28	50	80.51
	State	1,817	5,963	1.13	50	6.84
	Private	6,768	22,205	4.21	50	25.49
	Total	29,963	98,307	18.62	50	112.84
Separate Gas Collection (8 to 10 inch Polyethylene)	Federal	22,582	74,090	14.03	50	85.04
	State	1,700	5,579	1.06	50	6.40
	Private	4,008	13,149	2.49	50	15.09
	Total	28,290	92,818	17.58	50	106.54
Separate High pressure Gas Collection (8-16 inch Steel)	Federal	10,487	34,407	6.52	80	63.19
	State	838	2,748	0.52	80	5.05
	Private	5.554	18,224	3.45	80	33.47
	Total	16,879	55,379	10.49	80	101.71
Common Utility Corridors*	Federal	73,283	240,440	45.54	50	275.99
	State	10,248	33,623	6.37	50	38.59
	Private	22,250	79,002	13.83	50	83.79
	Total	105,780	347,065	65.73	50	398.38
Totals		180,911	593,569	112.42		719.46

* Common utility corridors include jointly-buried low-pressure gas and water pipelines as well as 480-volt electrical power lines. Separate facilities are those not buried in a common trench. Rounding issues may affect table totals.

Pipeline Construction

The pipelines to collect low-pressure gas and water from individual wells and deliver it to field trunk lines would be laid in a ditch constructed by a small mechanical-belt ditching machine. This method of construction would involve very little surface disturbance and clearing of little or no vegetation. The construction ROW for low-pressure gas collection pipelines would be 50 feet. The actual width of the trench would typically be 24 inches, but could range from 18 to 36 inches. Wider trenches result from the necessity of using backhoe excavation in areas of near-surface bedrock. Backhoe excavation is expected to be confined to small segments of the pipeline corridors.

Depth of cover over the water and low pressure gas pipelines would be a minimum of 36 inches. Where feasible, trenching would be to a depth of approximately 60 inches. Construction of the gas and water collection lines is expected to last approximately 18 months and would occur simultaneously with well development.

For the steel collector pipelines, a wheel trencher would be used to dig a 24- to 30- inch wide trench, stacking the dirt beside the ditch. In rocky areas or areas where the pipeline changes direction, an excavator would be used. The ditch would be excavated to a minimum depth adequate to allow for 48 inches of cover on the pipeline, or as otherwise requested by individual surface land owners.

Bulldozers with side booms would be used to lower the pipe into the trench. In rocky areas, the trench would be padded with sand or soil, if necessary, using a padding machine, which separates rocks from satisfactory padding materials. After the pipe is placed in the ditch, a motor grader or caterpillar would be used to push the dirt back into the trench. The fill on the trench would then be tamped into place with the grader wheels, leaving a berm of approximately four inches to accommodate settling.

Pipelines would cross streams according to the requirements of permitting under Section 404 of the Clean Water Act. Overall, the crossings would be constructed to minimize the length and the locations of the crossings would be returned to their approximate original configurations. If required, pipeline corridors would be bored beneath county roads or railroads in accordance with regulations of the Wyoming Public Utilities Commission or other applicable agency. Disturbance associated with boring would be less than the equivalent trenching disturbance analyzed in this EA.

Pipeline and road construction would be subject to Wyoming stormwater pollution regulations. At least 30 days prior to construction, the Company would prepare a Stormwater Pollution Prevention Plan (SWPP) and file a Notice of Intent (NOI) with the WDEQ for those construction elements subject to stormwater standards. Such construction would not commence prior to receiving a certification letter from WDEQ.

Pressure Testing

All gas-carrying pipelines in the Project Area would be continuously monitored for leaks. Monitoring gas flow rates and pressure data at individual wells and compressor stations would indicate if a leak were present in the system. If a leak were suspected, the pipelines would be pressure-tested by closing valves in the pipelines. The natural increase in well or compressor pressure would be used to detect and locate the leak. Leaks would be repaired by Company personnel.

2.1.1.6 Gas Compression

Transport of gas within and beyond the Project Area would require maintenance of pipeline pressures sufficient to move the gas. Pressure control would be achieved through the use of gas compressor facilities. The Company proposes to use natural gas-powered compressors at all compressor stations throughout the Project Area. The internal combustion engines that power the compressors, in addition to dehydration units and any other emissions sources, would be permitted with WDEQ Air Quality Division. All compressors would be completely enclosed within constructed and fenced buildings. The gas compressor locations are illustrated on **Figure 2-2, Project Facilities Maps**.

Gas produced from each well would flow through buried 3- to 12- inch polyethylene pipe to the first stage compressor stations. Typical pressure in the lines from the wells is less than 50 psi. At first stage compressor stations, low-horsepower (HP) (typically approximately 350 - 800 HP) natural gas powered, typically rotary screw, compressors would increase the gas pressure from 50 to 125 psi to facilitate the flow of gas through the pipelines that convey the gas from there to

the second and third stage compressors. Each first stage station would consist of one or more compressors, depending on the volume of gas being delivered to the station at any given time during the Project life. Most stations would not be expected to contain more than two compressors, with an estimated maximum total number of eight compressors to be installed and used as part of the Proposed Action. Each first stage compressor can compress gas from 15 or more wells, depending upon production rates. The Project would require five first stage compressor stations.

Gas from the first stage compressor sites would flow through steel lines to a second and third stage compressor station, located in NENWSE of Section 23, T42N, R71W. High horsepower (typically approximately 1,650 HP) compressors at this station would increase the pressure of natural gas to an estimated 700 to 1,450 psi to facilitate transmission of the natural gas to the existing high pressure transmission pipeline. The proposed station would consist of one to six second and third stage compressors, depending upon the volume of gas being delivered to the station at any given time during the project life.

During the latter stages of production, individual wells may be equipped with small blower compressors. These units would be powered by electric motors and enclosed completely within the well housing.

After all necessary permits have been obtained, compressor station construction would commence. Vegetation would be cleared and topsoil would be stripped and stockpiled. An area of about two acres or less (for first stage compressor stations) or five acres or less (for the second and third stage compressor stations) would be graded using standard cut-and-fill construction techniques and machinery (bulldozer and/or grader). Concurrent with construction of the compressor sites, gas pipelines would be built to the sites. In addition, clear lamp lights, approximately 250 watts each, would be installed to light each compressor facility. Each light would be mounted on a pole or building and directed downward to illuminate key areas within the facility while minimizing the amount of light projected outside the facility.

Glycol dehydration units would be installed at the second and third stage compressor site. The dehydration units would be used to reduce the water in the gas stream to acceptable levels for pipeline transmission. The units would have a design flow rate that would accommodate the compression capacity of the station. Extracted water vapor would be vented.

2.1.1.7 Facilities for Collection and Disposition of Produced Water

Detailed information regarding produced water management is available in the Water Management Plan (Independent Production Company, 2002). Certain details relating to water management in this EA differ from those in the Water Management Plan because of the removal of the Porcupine POD acreage from the Proposed Action, as discussed in Chapter 1.

Water produced in conjunction with CBM development would be pumped up the tubing to the surface where it would be gathered in a pipeline for transport to a discharge point. Each discharge point would release water to an ephemeral drainage for ultimate transport to collection or storage reservoirs. Water would be gathered from individual wells and transported through

buried polyethylene pipelines with 2- to 4- inch O.D. to the discharge points. Discharge points would receive water from 1 to 65 wells. Discharge volumes would be metered at each well. The Company plans to construct approximately 14 separate discharge points. The locations of facilities dealing with produced water are indicated on **Figure 2-2, Project Facilities Maps**.

Volumes of produced water are expected to vary considerably (100 to 1,000 barrels per day, or 2.92 to 29.17 gpm, per well) over different portions of the Project Area.

Water produced in association with CBM would decrease over time. Current best estimates from basin-wide studies are that water production from each well would exhibit an annual decline of approximately 50 percent (Eastern Research Group, 2002, pg. 4). Assuming an 18-month development schedule, water production is expected to peak rapidly to a maximum gross discharge rate of nearly 90,000 barrels per day (2,625 gpm) approximately 12-15 months following commencement of drilling. Water production should rapidly decline following the peak, dropping by an estimated 35-50 percent in the first year after peak production. Actual water flows reaching the mine reservoirs would be less than gross production because of conveyance losses occurring within the channels of discharge streams (Independent Production Company, 2002, pp. 16 to 23).

Produced water would be released to Porcupine Creek, a Class 3 ephemeral drainage, or to tributaries of Porcupine Creek. All the drainages tributary to Porcupine Creek represent well-developed, stable low-gradient ephemeral streams. At the request of the USFS, water would also be discharged to an off-channel pond located in Section 34, T42N, R71W. No water would be released from this pond.

Disturbance area for each discharge point would be approximately 0.034 acres. The Company plans to construct approximately 14 discharge facilities. Six of these facilities would be located on USFS surface, one on State of Wyoming surface, and the remaining 7 on private surface. Most discharge points would incorporate a stock tank equipped with an overflow device directing produced water to an outfall within the ephemeral drainage. The outfall point would be stabilized with concrete, rock, or other appropriate materials, as required to reduce discharge velocities and minimize splash and erosion between the outfall and the channel.

Two existing stock reservoirs would be upgraded to receive CBM water. Each of these reservoirs would be permitted to accept CBM water according to regulations of the WSEO. Both of these reservoirs are located on private surface. Total disturbance associated with upgrading the two reservoirs would be approximately 1.5 acres.

Most of the water released into the ephemeral stream channels or to upgraded stock reservoirs would ultimately drain to an existing impoundment, known as the Mine Collection Reservoir, operated and owned by the NARC coal mine located in Section 36, T42N, R70W (**Figure 2-2, Project Facilities Maps)**. From this facility, discharge water would be pumped to three existing reservoirs constructed by PRCC in the northeastern portion of the Project Area. Several of the discharge points would produce water to drainages directly served by these reservoirs.

The mine reservoirs were built mainly for flood control purposes. They would also permit storage of up to 145 acre-feet of Project-produced water. All mine impoundments have been permitted appropriately with the WSEO.

2.1.1.8 Electrical Power Utilities

Down-hole electric submersible pumps and automation equipment would require electric power. Based upon projected power demands for 226 producing wells, it is anticipated that the Project would have a peak daily demand of approximately 1,065 kilowatts (kW). Power usage would be expected to decline over the life of the Project as water production decreases.

2.1.1.9 Above Ground Facilities

A system of three-phase, 14.4/24.9 kilovolt (kV) distribution lines originating at the existing 69-14.4/24.9 kV Porcupine Substation, located in SESESE Section 34, T42N, R71W, would be constructed to serve the Project. This system would connect the substation to 30 metering points mounted on poles located above ground throughout the Project Area. The meter points would generally be located along the access roads or additional ROWs. The installation and electric power for the above ground electric distribution system would be provided by Powder River Energy Corp (PRECorp), the local electric utility company. The proposed power system is illustrated on **Figure 2-2**, **Project Facilities Maps**.

The above ground power lines would be constructed of 4/0 aluminum conductor, steel reinforced (ACSR) bare cable tied to the top of insulators for the main trunk line and 1/0 ACSR for the radial taps. The conductor will be mounted on penta-treated single wood poles approximately 35 feet above ground level. The standard tangent structure for the proposed lines would be a VC1-2R raptor proof pole with a 10-foot wood cross arm and cross braces and would be equipped with perch inhibitors.

Poles would be installed in augured holes using wheeled equipment per standard Rural Utilities Service (RUS) construction methods. Holes would be excavated to a depth of 6 to 8 feet. Poles and other structural components would be transported to the construction site, where they would be assembled and then erected by a digger truck and a framing crew. A typical crew consists of four to five laborers utilizing a digger truck, wire truck and several pickup trucks. Following backfill, soil would be compacted around each pole and anchor. Poles would be installed approximately every 300 feet.

A 15-foot wide easement would be required. An average of 20 pole and anchor holes are drilled per mile of line. Based on a 30-inch auger diameter, approximately 0.001 percent of the surface area of a 15-foot wide ROW per mile of line is actually disturbed. Clearing of vegetation is generally not required for line construction or maintenance in non-timbered areas such as found in the Project Area. Construction of the total Project primary power (14.4/24.9 kV) system, assuming favorable weather and soil conditions, would require approximately 70 working days. The portion located on USFS land would require approximately 40 days to construct.

Approximately 30.0 miles of above ground utility lines would be constructed in the Project Area. Approximately 19.8 miles would be on federal surface, 5.5 miles on State of Wyoming surface, and 4.7 miles on private surface. Above ground electrical utility surface disturbance would be approximately 0.45 acre on federal surface, 0.05 acre on State of Wyoming surface, and 0.15 acre on private surface. Total disturbance associated with above ground utilities is approximately 0.67 acre, including disturbance associated with meter boxes.

Guidelines of the 2001 revision of the TBNG LRMP (pg. 1-29) call for burial of power lines carrying less than 33 kV. However, within the Project Area portion of the Hilight Bill Geographic Area, exceptions to this guideline include:

- Scenic integrity objectives (SIO) of the area can be met using an overhead line (Hilight Bill SIO in the Project area is "low", or
- Greater long-term site disturbance would result.

In addition, buried high voltage power lines represent a risk to human life in an area characterized by frequent drilling and digging activity performed by persons not employed by the electric power industry. U.S. Labor Department statistics indicate that nationally 14 construction workers were killed between 1992 and 1998 by contact with buried high voltage electric lines (Electronic Library of Construction and Occupational Safety and Health, 2004, online data). For these reasons, the Proposed Action would use above ground primary power distribution.

Underground Facilities

Between the metering points and wells, the secondary electric service power lines (480 volt) would be buried, usually in the same trenches with the pipelines that collect produced water and gas, thus eliminating additional surface disturbance. Occasionally, a separate ditch may be required for individual secondary 480-volt power lines to optimize electric distribution. Common utility corridors have a ROW of 50 feet, although actual excavation disturbance would typically be significantly less. Approximately 2.4 miles of separate, underground electric lines would be constructed on the Project Area. Approximately 1.4 miles would be on federal surface, 0.6 mile on State of Wyoming surface, and 0.4 mile on private surface. Surface disturbance would be approximately 8.5 acres on federal surface, 3.8 acres on State of Wyoming surface, and 2.2 acres on private surface. Total disturbance associated with separate underground electric lines is approximately 14.5 acres.

A summary of electrical utilities disturbance is indicated in **Table 2-4**.

Table 2-4 Summary of Electrical Utilities Disturbance, Proposed Action

Facility	Surface Ownership	Length (Meters)	Length (Feet)	Length (Miles)	ROW (Feet)	Maximum Disturbance (Acres)
Common Buried Utility Corridors *	Federal	73,283	240,440	45.54	50	275.99
	State	10,248	33,623	6.37	50	38.59
	Private	22,250	73,002	13.83	50	83.79
	Total	*105,780*	*347,065*	*65.73*		*398.38*

Facility	Surface Ownership	Length (Meters)	Length (Feet)	Length (Miles)	ROW (Feet)	Maximum Disturbance (Acres)
Separate Buried 480 Volt Electric Network	Federal	2,254	7,394	1.40	50	8.49
	State	1,011	3,316	0.63	50	3.81
	Private	589	1,932	0.37	50	2.22
	Total	*3,853*	*12,642*	*2.39*		*14.51*
New Overhead 14.4/24.9 KV Distribution Lines	Federal	31,871	104,568	19.80	15	0.04
	State	8,771	28,778	5.45	15	0.01
	Private	7,617	24,991	7.73	15	0.01
	Total	*48,259*	*158,337*	*29.99*		*0.05*
34 Pole Mounted Meter Boxes **	Federal	21	21	21	30	0.43
	State	2	2	2	30	0.04
	Private	7	7	7	30	0.14
	Total	*30*	*30*	*30*		*0.62*
Totals		157,892	518,044	98.11		413.56

* Common utility corridors include jointly-buried low pressure gas (50 psi) and water pipelines as well as 480-volt electrical power lines. Separate facilities are those not buried in a common trench.
** Meter box disturbance area is 30 feet square. Numbers in miles column indicate number of boxes.
Lengths for common utility corridors are also reported in Table 4. Rounding issues may affect table totals.

2.1.10 Construction Resource Requirements

Construction of the Project would require a variety of equipment and materials, primarily water, sand, and gravel. Water would be needed for constructing roads and compressor stations. It also would be needed for drilling and completing wells. Overall, the requirement for water to construct the Proposed Action is expected to be approximately 38.94 acre-feet . This water would be obtained from approved local sources, typically from another producing CBM well. Project Area construction, including drilling of wells, would occur during daylight hours. Construction water requirements are indicated in **Table 2-5**.

Table 2-5 Construction Water Requirements, Proposed Action

Facility	Water Requirements per Unit (Ac-ft)	Number of Units (by Surface Ownership)			Total Water Requirements per Category (Ac-ft)
		Federal	State	Private	
Constructed and Improved Roads	0.1/Mile	23.76	4.39	12.41	4.06
Well Sites	NA	-	-	-	-
Drilling and Casing	0.07/Well	161	18	53	16.24
Well Completion	0.08/Well	161	18	53	18.56
Collection Pipelines	NA	-	-	-	-
Trunkline Pipelines	NA	-	-	-	-
Compressors (First Stage)	0.01/Compressor Site	5	0	0	0.05

Facility	Water Requirements per Unit (Ac-ft)	Number of Units (by Surface Ownership)			Total Water Requirements per Category (Ac-ft)
		Federal	State	Private	
Compressors (Second and Third Stage)	0.03/Compressor Site	0	1	0	0.03
Discharge Facilities	NA	-	-	-	-
Totals					38.94

Construction crews for utilities (water and low-pressure gas lines and electrical lines) typically consist of about six to eight workers and eight to 11 pieces of major construction equipment. Construction equipment would include one-ton roustabout trucks, trenchers and/or ditchers, backhoe, blade (grader), pipe trailer, foreman pickup, mower and tractor/cable spooler.

Crews for drilling and casing the wells typically consist of three to seven workers. Major equipment in addition to the truck-mounted drill rig would include excavation equipment, and water and roustabout trucks.

Construction of first stage compressor sites requires conventional dirt moving equipment (backhoe, blade, and/or dozer), gravel delivery trucks, a crane to set and level the first stage compressor(s), a cement truck to pour foundation pillars for pipe manifolds, electrician(s), and welder(s) to fabricate necessary piping at the site. Typically no more than seven to eight people are working at the first stage compressor site during the construction phase at any one time.

Construction of second and third stage compressor sites would require the same dirt equipment as used for first stage compressor sites to level and prepare the site. Typically about 20 people may be working at a second and third stage compressor site during the construction phase. These workers include delivery truck drivers, electricians, welders, laborers, and engineer(s).

In addition to the construction personnel, the Company would typically have one or two construction foremen at the sites during all critical phases of the process. Following construction, a minimal number of personnel would be required to operate the field. A summary of construction personnel requirements is indicated in **Table 2-6.**

Table 2-6 Construction Personnel Requirements, Proposed Action

Construction Category	Typical Construction Time	Number of Units	Typical Number of Workers During Construction
Access Roads	0 6 days/mile	40.56 miles	2
Well Sites	0.5 days/site	232 sites	1
Drilling and Casing	3 days/well	232 wells	3 - 7
Well Completion	2 days/well	232 wells	4 - 7
Collection Pipelines	6 days/mile	101.93 miles	6 - 8
Trunkline Pipelines	6 days/mile	10.49 miles	6 - 8
Compressors (First Stage)	3 days/compressor	5 stations	7-8
Compressors (Second and Third Stage)	21 days/compressor	1 station	18 - 22
Discharge Facilities	2 days/facility	14 facilities	3 - 5

2.1.2 Production and Maintenance

2.1.2.1 Roads

The counties and Company would have primary responsibility for maintaining the Project's improved roads in the Project Area. The counties would continue to maintain existing county roads. The Company would maintain all other Project roads, gates, cattle guards, culverts, and low water crossings.

Routine maintenance in the Project Area would occur on a year-round basis as weather conditions permit. The maintenance program would include postponing travel on two-track roads during and immediately after wet weather when rutting could occur. Summer (late spring to early fall) road maintenance could include the addition of gravel and blading improved roads consistent with standard maintenance operations in the area, grading borrow ditches and cleaning out culverts and low-water crossings. Noxious weeds also would require yearly control along roads. Non-native invasive plant species and noxious weeds located along roads would be controlled by personnel appropriately licensed and approved by the USFS using methods approved by the USFS and in coordination with the Campbell County Weed and Pest Control District. Winter (late fall to early spring) maintenance would include blading snow from access roads and some summer-like maintenance when necessary and permitted by weather conditions. The Company does not anticipate the need for routinely employing dust abatement procedures on roads within the Project Area during production and maintenance.

When the Project is complete, all roads constructed specifically for the Project would be removed and reclaimed unless the landowner, USFS, or county specifically request that a road be retained. If a landowner or governing agency decides to keep a road, the landowner or agency would accept responsibility for continued maintenance following abandonment by the Company. Decommissioning and reclamation of constructed or improved roads on USFS surface, or transfer of those roads to USFS control, would be determined by the results of the USFS Roads Analysis Process, as summarized in **Appendix M**.

2.1.2.2 Wells

Routine Maintenance

A maintenance person (a lease operator) could visit each well daily to ensure that the equipment is functioning properly. However, automated well monitoring equipment proposed for the Project would normally reduce the amount of field traffic. Maintenance personnel would remotely calculate balances between wells and collection and transfer points to ensure that the volumes match within acceptable tolerances. Significant leaks in gas or water pipelines would cause a loss of pressure that would be detectable by pressures and rates measured at each well and compressor site. If a leak were detected, a well would be shut in until pressure testing located the leak and the situation could be corrected. Routine maintenance of the various mechanical components of the gas production would occur at intervals recommended by manufacturers or as needed based on site visits.

The automated monitoring system would allow remote observation of conditions at each well. The system would monitor various operating conditions (such as gas and water production rates, pipeline pressure, and other parameters) to evaluate whether abnormal conditions exist. The operating conditions at the well site would be transmitted via radio to a central facility not located on USFS land. Maintenance personnel would be dispatched to the well site if a problem were identified. Control and monitoring of well production by radio telemetry would typically result in weekly or bi-weekly visits to wells by maintenance personnel. Other factors, such as the need for visual inspection of gas and water pipelines, could require more frequent visits to specific wells for safety or environmental reasons.

Workovers

Periodic down-hole well maintenance (workover) would be required. A workover uses a truck-mounted derrick to pull and replace pumps. Workovers are typically needed within the first few months after initial completion to remove coal fines from pumps and can include repairs to the well bore equipment (casing, tubing, or pumps), the wellhead, or the productive formation. Workovers may require venting of minor volumes of natural gas to reduce pressure. Routine repairs would occur only during daylight hours and would usually be completed within one day. Several days may be required to complete a workover in some situations. Although the frequency of workovers cannot be predicted because the requirements vary from well to well, each new well would likely require a workover during the first year of production.

2.1.2.3 Pipelines

Gas and produced water pipelines would be routinely inspected along with other facilities. If pressure losses or abnormal flow rates were detected, the abnormality would be isolated and addressed. Non-native invasive plant species and noxious weeds located along pipeline routes would be controlled by personnel appropriately licensed and approved by the USFS using methods approved by the USFS and in coordination with the Campbell County Weed and Pest Control District.

2.1.2.4 Gas Compression

The Company would have primary responsibility for maintaining the Project's first, second, and third stage gas-fired compressors located at six first stage compressor stations and a single second and third stage compressor station in the Project Area. Routine maintenance in the Project Area would occur on a year-round basis by Company personnel traveling in vehicles to the compressor stations accessed by all weather, graveled roads (**Figure 2-2, Project Roads Map**). Compressors at the compressor stations would be routinely inspected as needed to ensure proper operating conditions and to conduct routine maintenance operations to ensure safe and efficient gas compression.

2.1.2.5 Electrical Utilities

Routine inspection and maintenance of the primary electric utilities (14.4/24.9 kV) would be done by PRECorp.

2.1.3 Decommissioning and Reclamation

The Proposed Action assumes the production phase would last for four to seven years and then reclamation would occur for those wells and facilities not previously reclaimed or removed for coal mining activities.

2.1.3.1 Roads

The USFS has used the Proposed Transportation Plan as the basis for a Roads Analysis. The analysis has determined which Project roads will be reclaimed, which new construction may be incorporated into the existing roads network, and which existing roads on National Forest System lands may be reclaimed as a consequence of Project road construction. This process has been summarized in **Appendix M**.

Post-project incorporation of any Project roads into the USFS transportation system would require acceptance of responsibility by the USFS through execution of a release from future maintenance by the Company. On private lands, the Company would execute release of the road to the landowner or reclaim it according to the terms of surface use agreements that may be in effect at that time.

Two track roads scheduled for decommissioning would be ripped or plowed and drill seeded as required by the Authorized Officer or the surface owner. All road disturbances on federal lands would be reseeded with a seed mixture approved by the Authorized Officer, as described in the APD, Surface Use Program (SUP), or Project COAs. The seed mixture would be planted in the amounts specified in pounds of pure live seed per acre. All seed would be certified as weed free. Seed would be tested in accordance with state laws and within 12 months before purchase. Commercial seed either would be certified or registered. Seeding and planting would be repeated until satisfactory revegetation is achieved, as determined by the surface management agency. Multi-year control of noxious weeds may be needed on some reclaimed areas.

2.1.3.2 Well Bores and Well Sites

All surface facilities would be removed. Depleted production holes would be plugged and abandoned in accordance with Onshore Oil and Gas Order No. 2 and rules of the WOGCC. Once the well is stabilized with no gas flow or liquid level changes, it would be de-commissioned by pouring redundant plugs, a slurry of cement and water, at strategic locations in the well bore. These locations would be based on each well's configuration, but would be placed to prevent migration of fluids or gas up the well bore or via any un-cemented paths. A mixture of bentonite and water would be placed between the cement plugs. A pipe monument giving the location, lease number, operator, and name of the well is required unless waived by the appropriate agency. If waived, the casing may be cut off and capped below ground level.

Landowners may request assignment of CBM wells planned for abandonment to use for water production. When such a well is assigned, all rights and responsibilities, including reclamation, pass to the landowner unless otherwise specified. The landowner must then properly permit the well for beneficial uses after CBM production has ceased according to WSEO's procedures and policies.

2.1.3.3 Pipelines

The underground pipelines would be cleaned, disconnected, and then abandoned in place to avoid any unnecessary surface disturbance, as noted in the COAs for the APD, or the Plan of Development for the ROW or SUP.

2.1.3.4 Gas Compression

At the end of well production in the Project Area, all compressor station facilities no longer needed for longer-term gas compression would be dismantled and removed from the Project Area for use elsewhere and/or disposal. Gravel surfacing of access and parking areas within the station sites and graveled roads constructed and maintained to the stations would be salvaged and removed from the Project Area to an approved location or new use. Gravel road decommissioning on National Forest System lands would occur in accordance with the USFS-approved Road Analysis and decommissioning plan.

All decommissioned compressor station sites on federal lands would be reseeded with a seed mixture approved by the Authorized Officer, as described in the APD, SUP, or Project COAs. The seed mixture would be planted in the amounts specified in pounds of pure live seed per acre. All seed would be certified as weed free. Seed would be tested in accordance with state laws and within 12 months before purchase. Commercial seed either would be certified or registered. Seeding and planting would be repeated until satisfactory revegetation is achieved, as determined by the surface management agency. Multi-year control of noxious weeds may be needed on some reclaimed areas.

2.1.3.5 Electrical Utilities

Underground electric lines would be disconnected and abandoned in place to avoid any unnecessary surface disturbance. Unused above ground lines would be disconnected and the power poles would be removed from the sites. Surface disturbance associated with the removal would be reclaimed in accordance with the APD, COAs, Special Use Permits, or the Surface Use Plan.

2.1.3.6 Reclamation Costs and Bonding

Cost figures provided by the Proponent indicate average reclamation costs for Powder River Basin CBNG facilities are approximately:

- plugging and abandonment of well and well site reclamation - $3,000 per location

- reclamation of two-track roads - $400 per mile
- reclamation of utility corridors - $150 per acre
- reclamation of water discharge outfalls - $1,000 per outfall
- compressor site - $1,000 per site

Using these figures and information from various tables in Chapter 2 of the EA, reclamation costs for federal surface for the Proposed Action would be approximately:

• well sites -	$564,000
• roads (assuming all roads reclaimed) -	$9,500
• utility corridors -	$75,705
• water discharge features -	$6,000
• compressor sites -	$5,000
• TOTAL -	$660,205

Prior to commencement of surface-disturbing activities on federal lands or in split estate areas with private surface and federal minerals, the Proponent is required to post and maintain in good standing a federal bond (43 CFR 3104) in the amount of $150,000 for nationwide coverage. No activities, for example, issuance of APDs by the BLM, may be authorized in the absence of a valid federal bond. The bond must be maintained, i.e., in the event there is a draw against the bond, the Proponent is required to restore the bond to its original amount to continue operating on federal lands or minerals. In the event a demand against a federal bond has occurred within the five years prior to request for issuance of APDs, the Authorized Officer may increase the amount of the required bond, up to an amount sufficient to cover all costs associated with plugging all wells and reclaiming all lands covered by the bond. In addition, the amount of the bond may be increased at the discretion of the Authorized Officer in the event there has been a history of various types of violations (43 CFR 3104.5) by the bonded party. The Proponent is covered by a nationwide federal bond.

2.1.4 Summary

Implementation of the Proposed Action would result in short-term and long-term disturbances to the surface. Long-term disturbance is that associated with the life of the Project. Short-term disturbance would occur during a portion of the Project life, typically prior to commencement of the production phase. Short-term disturbance would affect approximately 938 acres or six percent of the Project Area. Most of it would be associated with the construction of pipelines and roads. Interim reclamation would occur after a well is drilled, completed, and pipelines and compressor stations are installed. Interim reclamation restores areas not needed for production to their original state, or as close as possible. After interim reclamation takes place, the Proposed Action's disturbance would be reduced to approximately 114 acres for the long term. Long-term disturbance would include approximately 72 acres on USFS surface, 14 acres on State of Wyoming surface, and 28 acres on private surface. Roads comprise most of the long-term disturbance.

A summary of short- and long-term disturbance associated with the Project is indicated in **Table 2-7**.

Table 2-7 Summary of Estimated Short-Term and Long-Term Disturbance, Proposed Action

Facility	Short-Term Maximum Disturbance (Acres)				Long-Term Maximum Disturbance (Acres)			
Surface Ownership	**Federal**	**State**	**Private**	**Total**	**Federal**	**State**	**Private**	**Total**
Well Sites	83.16	9.30	27.38	119.83	20.79	2.32	6.84	29.96
Roads								
2-Track	33.11	6.39	17.74	57.24	33.11	6.39	17.74	57.24
Improved	7.28	0.00	1.51	8.79	7.28	0.00	1.51	8.79
Low-Pressure Pipelines								
Common Utility Corridors*	275.99	38.59	83.79	398.38	0.00	0.00	0.00	0.00
Separate Water Pipelines	80.51	6.84	25.49	112.84	0.00	0.00	0.00	0.00
Separate Gas Pipelines	85.04	6.40	15.09	106.54	0.00	0.00	0.00	0.00
High-pressure Pipelines								
High-pressure Gas Collectors**	63.19	5.05	33.47	101.71	0.00	0.00	0.00	0.00
Water Management								
Discharge Facilities	0.20	0.03	0.24	0.48	0.20	0.03	0.24	0.485
Reservoirs	0.00	0.00	1.53	1.53	0.00	0.00	1.53	1.53
Compression* **								
First Stage	10.00	0.00	0.00	10.00	10.00	0.00	0.00	10.00
Second and Third Stage	0.00	5.00	0.00	5.00	0.00	5.00	0.00	5.00
Electrical Utilities								
Overhead 14.4/29.4 kV	0.04	0.01	0.01	0.05	0.04	0.01	0.01	0.05
Separate Buried 480 volt	8.49	3.81	2.22	14.51	0.00	0.00	0.00	0.00
Meter Boxes	0.43	0.04	0.14	0.62	0.43	0.04	0.14	0.62
Totals	647.44	81.47	208.62	937.52	71.85	13.80	28.02	113.67

* Common utility corridors may include jointly-buried low-pressure gas and/or water pipelines as well as 480 volt electrical power lines.

** Collector gas pipelines transport gas from the first stage compressors to the second and third stage compressor.

*** First stage compressors facilitate gas transport from the low-pressure collection pipelines to the second and third stage compressors. The latter compressors increase the gas pressure sufficiently for transport via the high pressure transmission pipeline.

2.2 NO ACTION

A No Action Alternative is intended to provide a benchmark that enables the decision-maker to compare the magnitude of environmental effects among alternatives to existing management conditions. Under the No Action Alternative, the BLM or USFS would deny the proposal as currently described in the Proposed Action on federal surface or minerals in the Project Area. As discussed previously, the ability of a decision-maker to select the No Action Alternative is severely constrained by the contractual rights of the Company to develop its mineral leases as granted by the United States. It is effectively a hypothetical scenario, representing a baseline of existing conditions within the Project Area. Existing conditions within the Project Area are indicated on **Figure 2-3, No Action Alternative Maps**. Consideration of the No Action Alternative is required by NEPA (40 CFR 1502.14 (d)).

Selection of the No Action Alternative would allow existing land uses to continue in their present state. Existing surface management activities, such as surface coal mining, livestock grazing, and wildlife habitat would continue as they are currently implemented. Implementation of the No Action Alternative, as presented in this hypothetical analysis, would preclude all drilling, construction, production, and reclamation activities as planned by the Proposed Action. CBM development would continue in the general area of the Project on federal, state, and private lands. In particular, the expected expansion of existing adjacent surface coal mines into the Project Area would have major impacts on virtually all resources, as discussed in Section 4.2.1.

Denial of the current proposal is not a denial of natural gas development in the Project Area. Although the BLM can deny approval of a particular APD, it cannot deny, in general, occupancy of the surface for the exploration and development of federal minerals that have been leased, unless they were leased with a no surface occupancy stipulation. An oil and gas lease grants the lessee the "right to drill for, extract, remove, and dispose of all oil and gas deposits" from the leased lands, subject to the terms and conditions of the respective leases (BLM Form 3100-11). The denial of the right to develop a valid lease would violate the lessee's contractual rights, as well as result in the loss of federal royalties. Authority for denial can be granted only by Congress (United States Constitution, Article IV, Section 3, Clause 2). The BLM, therefore, can only suspend the lease pursuant to Section 39 of the Mineral Leasing Act pending consultation with Congress for a grant of authority to preclude drilling and provide required compensation to the lessee.

Because the Secretary of the Interior has the authority and responsibility to protect the environment associated with federal oil and gas leases, restrictions can be imposed on the lease terms. The BLM can impose reasonable conditions on the lease, not inconsistent with the purposes for which the lease is issued and prior to issuance of the lease, if unnecessary or undue environmental degradation would occur as the result of minerals development. No imposed conditions would allow denial of all drilling activity where leases have been issued with surface rights (43 CFR 3101.1-2, BLM IM 92-67).

A decision for the No Action Alternative would be considered under the following circumstances:

- If there were no acceptable means of mitigating significant adverse impacts to stipulated surface resource values, such that approval would result in a violation of protective environmental laws; or
- If the USFWS were to conclude that the Proposed Action would likely jeopardize the continued existence of any threatened, endangered, proposed, or candidate species, in which case the leasing permit application may be denied in whole or in part.

The selection of the No Action Alternative, as a hypothetical consideration, would not allow existing leases to be developed. Its selection would indicate that project development would significantly adversely affect surface resource values, including the possibility of extinction of a protected species. Therefore, a No Action decision would likely result in future analysis under NEPA in order to re-evaluate current management guidance for the Project Area USFS lands.

The purpose and need for the Proposed Action includes protecting drainage of federal minerals by wells adjacent to the Project Area. Under 43 CFR 3162.2, an Operator must drill diligently and produce continuously to protect the federal government from royalty loss resulting from drainage. The BLM does not have discretionary authority to evaluate whether or not to approve federal wells which would protect the federal mineral estate from drainage.

2.3 MITIGATION MEASURES INCORPORATED WITHIN THE PROPOSED ACTION

The results of the scoping process were used to identify major issues of concern regarding the Proposed Action. The USFS and the Company have identified appropriate mitigation measures designed to minimize potential impacts from the Project. These measures have been incorporated by the Company into the Proposed Action and are indicated in **Table 2-8**.

In addition to the mitigation measures specified in **Table 2-8**, the USFS has identified a number of standard COAs required for CBM development on the TBNG. These requirements are listed in **Appendix C**.

During the summer of 2002, onsite inspections of the Proposed Action on USFS surface were conducted by representatives of the Company, the USFS, and the BLM. These inspections resulted in site-specific mitigations which have been incorporated into the Proposed Action and into this EA. These measures have been included as **Appendix H**.

Figure 2-3-1 No Action Alternative Maps

Figure 2-3-2 No Action Alternative Maps

Figure 2-3-3 No Action Alternative Maps

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Table 2-8 Mitigation Measures Incorporated Within the Proposed Action

Federal Requirements	
Drilling and Construction	
General Mitigation Measures	***Authority***
The disposal of trash, sewage, and other waste materials would be mitigated through defined procedures.	Onshore Oil and Gas Order No. 1 - Approval of Operations on Onshore Federal and Indian Oil and Gas Leases, III.G.4(b)(7); Forest Service Manual (FSM) 2100 Environmental Management and FSM 2800 Minerals and Geology
No waste material will be deposited below high water lines in riparian areas, floodplains, or in natural drainageways. The lower edge of soil or other material stockpiles will be located outside the active floodplain.	Onshore Oil and Gas Order No. 1 – Approval of Operations on Onshore Federal and Indian Oil and Gas Leases III. F.; ESA 16 USC 1531 *et seq.*
The Company has consulted with the USFWS, as required by Section 7 of the Endangered Species Act (ESA), the USFS regarding forest-sensitive species, and WGF Department regarding location of sage grouse leks.	Onshore Oil and Gas Order No. 1 – Approval of Operations on Onshore Federal and Indian Oil and Gas Leases III. F.; ESA 16 USC 1531 *et seq.*
Noise and odor would be minimized by the use of effective muffling of equipment engines and regular engine maintenance.	Noise Control Act of 1972 (42 USC 4901 *et seq.*, as amended)
The Company would initiate dust suppression activities by applying produced water to the road surface routinely and periodically during construction operations when there is little or no precipitation and also during times of unusual amounts of dust generation. Emissions of particulate matter from well site and resource road construction would be minimized by application of water with at least 50 percent control efficiency.	Record of Decision and Resource Management Plan Amendment for the Powder River Basin Oil and Gas Project, Standard Condition of Approval A.5.15.1
Impacts to cultural resources would be mitigated. A Class I inventory and Class III block survey have been conducted by USFS-permitted archeologists in portions of the Project Area not previously surveyed by surface coal mine operators or other agencies.	36 CFR 800 and procedures recommended by the Wyoming State Historic Preservation Officer (SHPO); National Historic Preservation Act, (16 USC 431 *et seq*.); Executive Order 11593
Should the Company uncover previously undiscovered cultural resources, the Company would notify the USFS or BLM, as appropriate, and cease operations at the site pending agency evaluation.	Archeological Resources Protection Act of 1979 (16 USC 470), FSM 2361.2.
The Company would instruct its employees and contractors in procedures to be followed in the event of discovery of human remains as required by applicable regulations.	Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001, 43 CFR 10)
Roads Mitigation Measures	***Authority***

Most new roads to well sites would be roughed in as two-track roads to minimize disturbance.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); 43 CFR 3162.5-1; Onshore Oil and Gas Order No. 1 - Approval of Operations on Onshore Federal and Indian Oil and Gas Leases, III.G.4.(b)(2); BLM Gold Book; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
If the well were completed, the access road would be maintained as necessary to prevent soil erosion and accommodate year-round use.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); 43 CFR 3162.5-1; Onshore Oil and Gas Order No. 1 - Approval of Operations on Onshore Federal and Indian Oil and Gas Leases, III.G.4.(b)(2); BLM Gold Book; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
The Company would prohibit off-road travel by its employees or contractors except in emergency situations.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); 43 CFR 3162.5-1; Onshore Oil and Gas Order No. 1 - Approval of Operations on Onshore Federal and Indian Oil and Gas Leases, III.G.4.(b)(2); BLM Gold Book; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
No road construction is expected to occur on slopes greater than 8 percent and no surface disturbance or occupancy would occur on slopes in excess of 25 percent.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); 43 CFR 3162.5-1; Onshore Oil and Gas Order No. 1 - Approval of Operations on Onshore Federal and Indian Oil and Gas Leases, III.G.4.(b)(2); BLM Gold Book; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Gravel or scoria may be applied to soft, rut-prone areas. Travel on two-track roads would be rescheduled or postponed during infrequent periods of wet weather when vehicular traffic could cause rutting.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); 43 CFR 3162.5-1; Onshore Oil and Gas Order No. 1 - Approval of Operations on Onshore Federal and Indian Oil and Gas Leases, III.G.4.(b)(2); BLM Gold Book; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Stream crossings and instream structures will be constructed to allow passage of flow, sediment, expected flood flows, and to allow free movement of aquatic life.	Final Environmental Impact Statement and Land and Resource Management Plan Revision, Thunder Basin National Grassland, 2002.
Drilling and Completion Mitigation Measures	***Authority***
Surface casing would be installed to protect fresh water aquifers.	Onshore Oil and Gas Order No. 1 - Approval of Operations on Onshore Federal and Indian Oil and Gas Leases, III.G.4.(a)(2); Onshore Order No. 2 Drilling III.B.
When a well is completed, all disturbed areas that are not needed for production facilities would be restored as soon as practical and typically within six months.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); 43 CFR 3162.5-1; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Well Site Mitigation Measures	***Authority***
Construction activities at well sites would be	30 USC Section 226(g), Mineral Leasing Act of

kept to a minimum to limit disturbance of vegetation and underlying soils, significant wildlife habitat, recreational value, wetlands, or riparian areas. Surface disturbance within 100 feet of ephemeral drainages would be avoided.	1920; 43 CFR 3162.3-1(f); 43 CFR 3162.5-1; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology; Executive Order 11990
The Company would employ the following mitigative measures in relation to wetlands: • Wetland and flood-prone areas would be crossed only during dry conditions. Winter construction activities would occur only when soils are not frozen. • As soon as possible following construction, wetland or drainage channels would be reclaimed as closely as feasible to pre-construction conditions. Where impermeable soils contributed to wetland formation, soil compaction would be used to reduce permeability. • Streams and ephemeral drainages would be crossed perpendicular to flow direction, wherever practical. • Wetland topsoil would be selectively handled. • Recontouring and UFSF-approved native species would be used for revegetation and soil stabilization.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); 43 CFR 3162.5-1; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Pipeline Mitigation Measuress	***Authority***
Gas and produced water gathering pipelines would be placed together in the same trench/ditch wherever possible to minimize surface disturbance.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); 43 CFR 3162.5-1; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
All pipelines would be installed in ROWs way along access roads or in utility corridors wherever possible to minimize disturbance	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); 43 CFR 3162.5-1; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Stream crossings and instream structures will be constructed to allow passage of flow, sediment, expected flood flows, and to allow free movement of aquatic life.	Final Environmental Impact Statement and Land and Resource Management Plan Revision, Thunder Basin National Grassland, 2002, Standard B4.
Pipeline construction will be conducted in such a way as to maintain, to the degree feasible, stream geometry and habitats.	Final Environmental Impact Statement and Land and Resource Management Plan Revision, Thunder Basin National Grassland, 2002, Standard B5.
Mowing of grasslands will be delayed until after July 15 to protect nesting birds and their broods.	Final Environmental Impact Statement and Land and Resource Management Plan Revision, Thunder Basin National Grassland, 2002, Guideline F6.
Produced Water Mitigation Measures	***Authority***
Produced water outfall points would be	30 USC Section 226(g), Mineral Leasing Act of

stabilized with concrete, rock, or other appropriate materials to reduce discharge velocities and minimize splash and erosion between the outfalls and the channels.	1920; 43 CFR 3162.3-1(f); 43 CFR 3162.5-1; Onshore No. 7 Disposal of Produced Water III.G.
USFS will consult with the Campbell County Weed and Pest Control district regarding West Nile virus. If determined to be necessary, a Condition of Approval would be applied at the time of APD approval to control for mosquitoes where CBM discharge waters become stagnant.	Record of Decision and Resource Management Plan Amendment for the Powder River Basin Oil and Gas Project Standard Condition of Approval A.5.4.10.
Electrical Power Utilities Mitigation Measures	***Authority***
Meter points would generally be located along access roads.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); 43 CFR 3162.5-1; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Secondary electric power lines would usually be co-located in common trenches with gathering and produced water pipelines, eliminating additional surface disturbance.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); 43 CFR 3162.5-1; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Construction Resource Requirements Mitigation Measures	***Authority***
Construction water would be obtained from approved local sources, typically from a nearby producing CBM well.	Onshore Oil and Gas Order No. 1 - Approval of Operations on Onshore Federal and Indian Oil and Gas Leases, III.G.4.(b)(2)
Production and Maintenance Operations	
Roads Mitigation Measures	***Authority***
The maintenance program would be consistent with standard maintenance operations in the area and would include postponing travel on two-track roads during and immediately after wet weather when rutting could occur.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); 43 CFR 3162.5-1; Onshore Oil and Gas Order No. 1 - Approval of Operations on Onshore Federal and Indian Oil and Gas Leases, III.G.4.(b)(2); FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Noxious weeds along roads would be subject to annual control measures.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); 43 CFR 3162.5-1; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology; Executive Order 13112-Invasive Species
Herbicides would not be stored within 500 feet of any special status plant species.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); 43 CFR 3162.5-1; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology; Executive Order 13112-Invasive Species
Pesticide application in areas of known habitat of sensitive butterfly species would be applied in such a way as to reduce butterfly mortality and avoid damage to nectar and larvae host species.	Final Environmental Impact Statement and Land and Resource Management Plan Revision, Thunder Basin National Grassland, 2002, Guideline F42..

Wells Mitigation Measures	***Authority***
A field-wide SPCCP Plan would be developed to mitigate unplanned spills.	40 CFR 112.1(b), 112.1(d), 112.1(f), 112.3(a) through 112.3(c), 112.3(f), and 112.4
Automated well telemetry equipment would remotely monitor Project wells, eliminating the need for daily routine inspections by lease operators and reducing the amount of field traffic.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); 43 CFR 3162.5-1; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology; Forest Service Handbook 7709.55 – Transportation Handbook
Decommissioning and Reclamation	
General Mitigation Measures	***Authority***
The Company would follow agency procedures or surface owner specifications designed to reclaim disturbed areas as close to pre-development conditions as feasible.	43 CFR 3162.3-1(f); Onshore Oil and Gas Order No. 1 - Approval of Operations on Onshore Federal and Indian Oil and Gas Leases, III.C., V.; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Where an existing dry dam on federal surface is removed to allow produced water discharge, the channel will be restored to a natural configuration, fill location will be approved by the Authorized Officer, and reconstructed areas will be stabilized and reseeded prior to upstream discharge of produced water.	Final Environmental Impact Statement and Land and Resource Management Plan Revision, Thunder Basin National Grassland, 2002, Standard B13..
Roads Mitigation Measures	***Authority***
Reclaimed roads on federal lands would be reseeded with a seed mixture approved by the appropriate agency.	43 CFR 3162.3-1(f); Onshore Oil and Gas Order No. 1 - Approval of Operations on Onshore Federal and Indian Oil and Gas Leases, III.C., V.; BLM Gold Book; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Pipelines and Electric Utilities Mitigation Measures	***Authority***
Underground pipelines would be cleaned, disconnected, and abandoned to avoid unnecessary surface disturbance.	43 CFR 3162.3-1(f); Onshore Oil and Gas Order No. 1 - Approval of Operations on Onshore Federal and Indian Oil and Gas Leases, III.C., V.; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Underground electric lines would be disconnected and abandoned in place to avoid unnecessary surface disturbance.	43 CFR 3162.3-1(f); Onshore Oil and Gas Order No. 1 - Approval of Operations on Onshore Federal and Indian Oil and Gas Leases, III.C., V.; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Gas Compression Mitigation Measures	***Authority***
Reclaimed compressor stations on federal lands would be reseeded with a seed mixture approved by the appropriate agency.	43 CFR 3162.3-1(f); Onshore Oil and Gas Order No. 1 - Approval of Operations on Onshore Federal and Indian Oil and Gas Leases, III.C., V.; BLM Gold Book; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology

State Requirements	
General Mitigation Measures	***Authority***
The Company would adhere to applicable national ambient air quality standards (NAAQS) and Wyoming ambient air quality standards (WAAQS) as required by WDEQ.	WDEQ, Air Quality, Chapter 3, Section 2(f)); Clean Air Act, 42 USC 7401 *et seq*.
Noise and odor would be minimized by the use of effective muffling of equipment engines and regular engine maintenance.	WDEQ, Air Quality, Chapter 2, Section 11(a)(ii) Ambient Standards
Drilling and Construction	
Well Site Mitigation Measures	***Authority***
Drilling mud pits will be located outside of riparian areas, floodplains, and wetlands where practical.	WOGCC Rules, Chapter 1, Section 2(jj)/
Pipeline Mitigation Measures	***Authority***
Pipelines would cross streams according to the requirements of permitting under Section 404 of the Clean Water Act.	WDEQ, Water Quality, Chapter II, Sections 1 and 2(a); Clean Water Act, 33 USC 1251 *et seq*.
At least 30 days prior to construction, the Company would prepare a Stormwater Pollution Prevention Plan and file a Notice of Intent with the WDEQ.	WDEQ, Water Quality, Chapter II, Sections 9(c), 10(a)(6), and 12(b) through (d); Clean Water Act, 33 USC 1251 *et seq*.
Produced Water Mitigation Measures	***Authority***
The produced water outfall points would be discharged on the surface for beneficial use.	WDEQ, Water Quality, Chapter II, Section 3(a)(1) and (2); Clean Water Act, 33 USC 1251 *et seq*.
The quality of discharged produced water would be monitored according to specifications of a National Pollutant Discharge Elimination System (NPDES) permit.	Federal Water Pollution Control Act, Section 402, 33 USC 1251-1387.
Applicant-Committed Mitigation Measures	
Drilling and Construction	
General Mitigation Measures	***Authority***
Onsite inspections of USFS portions of the Proposed Action have been conducted by representatives of the USFS, BLM, and the Company, and resultant mitigation measures have been incorporated into this EA.	NEPA, 42 USC 4321 *et seq.* 40 CFR Parts 1500-1508; 43 CFR 3162.3-1(f); 43 CFR 3162.5-1; Onshore Oil and Gas Order No. 1 - Approval of Operations on Onshore Federal and Indian Oil and Gas Leases, III.C., III.G.5.
The Company would require staff and contractors to safely operate motor vehicles to minimize the risk of collisions with wildlife, would acquaint staff and contractors with applicable wildlife laws, and would discipline workers violating such policies and laws.	Occupational Safety and Health Act, OSHA, 20 USC 651 *et seq.*

The Company would prohibit staff and contractors from illegal collection or destruction of cultural resources and would discipline workers violating such policies and laws.	Company policy
Firearms and dogs would not be allowed within the Project Area and Company drug, alcohol, and firearms policies would be rigorously enforced.	Company policy
The Company would implement hiring policies that would encourage the employment of area residents and, to the extent feasible, would purchase equipment and materials from local area merchants.	Company policy
Paleontological Resources Mitigation Measures	***Authority***
The Company has conducted a pedestrian paleontological survey of portions of the Project Area with high potential for discovery of vertebrate fossils and has prepared a monitoring and mitigation plan.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); 43 CFR 3162.5-1; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Roads Mitigation Measures	***Authority***
The company has submitted a proposed Transportation Plan to the USFS which provides detailed information allowing the USFS to complete a Roads Analysis procedure for efficient transportation management.	Forest Service Handbook 7709.55 – Transportation Handbook; 30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); Onshore Order No. 1, III.G.4.(b)(2); BLM Gold Book; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Production Facilities Mitigation Measures	***Authority***
A metal fence or rail may be placed around well houses and electrical panels to protect them from livestock or big game animals.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); Onshore Oil and Gas Order No. 1 – Approval of Operations on Onshore Federal and Indian Oil and Gas Leases 48 FR 48916 (1983). VII.; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Well houses would be painted in a color specified by the USFS and/or BLM to minimize visual impact.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Pipeline Mitigation Measures	***Authority***
The Company would prohibit construction or routine maintenance activities during periods when soil is too wet to adequately support construction equipment. Pipe would be buried and open trenches closed as soon as practical.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
If pipelines are constructed across flowing streams, trench fill will be covered with geo-fabric material to avoid potential erosion.	Final Environmental Impact Statement and Land and Resource Management Plan Revision, Thunder Basin National Grassland, 2002, Guideline B4.
Construction of pipelines would be planned to	30 USC Section 226(g), Mineral Leasing Act of

minimize impact to public use of existing roads and trails, or inhibit wildlife or livestock movement.	1920; 43 CFR 3162.3-1(f); FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Trees would be avoided during construction. Disturbance to areas of heavy sagebrush cover would be avoided as planned in on-site inspections. Soils would be left undisturbed over most of the construction work area.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f)
Reclamation would begin immediately after the pipeline is buried, weather permitting.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); Onshore Oil and Gas Order No. 1 – Approval of Operations on Onshore Federal and Indian Oil and Gas Leases 48 FR 48916 (1983). VII.; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Produced Water Mitigation Measures	***Authority***
The water would be beneficially used for stock and livestock watering and for dust suppression, washdown and reclamation efforts by the adjacent surface coal mine.	WDEQ, Water Quality, Chapter II, Section 3(a)(1) and (2); WDEQ, Water Quality, Chapter II, Section 3(a)(1) and (2); Clean Water Act, 33 USC 1251 *et seq*.; 43 CFR 3162.3-1(f); WDEQ, Air Quality, Chapter 3, Section 2(f)); Clean Air Act, 42 USC 7401 *et seq*.
A Project Water Management Plan was developed to anticipate produced water volumes and effectively manage its disposition.	Final Environmental Impact Statement and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project; 43 CFR 3162.3-1(f); Forest Service Manual (FSM) 2100 Environmental Management and FSM 2800 Minerals and Geology
The Company would contact all potentially affected landowners and offer a water well agreement for protection of municipal, domestic, and stock wells.	Final Environmental Impact Statement and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project
At the request of local landowners, the Company would upgrade existing stock reservoirs located within some of the drainages receiving produced water.	Onshore Oil and Gas Order No. 1 – Approval of Operations on Onshore Federal and Indian Oil and Gas Leases 48 FR 48916 (1983). VII
Electric Power Utilities Mitigation Measures	***Authority***
All construction would be designed according to the Avian Power Line Interaction Committee's 1996 guidelines for minimizing the possibility of raptor electrocution.	Onshore Oil and Gas Order No. 1 – Approval of Operations on Onshore Federal and Indian Oil and Gas Leases III. F.; ESA 16 USC 1531 *et seq.*
Construction would begin following receipt of a Special Use Permit from the USFS and would comply with USFS environmental resource protection stipulations.	FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Holes for the poles would be located to avoid disturbance of existing sensitive vegetation.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f)
Whenever possible, screw type anchors would be used on guyed structures to minimize ground disturbance.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); FSM 2100 Environmental Management and FSM 2800

	Minerals and Geology
Poles would be moved if topographic issues or impacts to cultural, vegetative, or wildlife resources were identified at the construction site.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Production and Maintenance Operations	
General Mitigation Measures	***Authority***
The Company would initiate suppression activities during times of unusual amounts of dust generation.	WDEQ, Air Quality, Chapter 3, Section 2(f)); Clean Air Act, 42 USC 7401 *et seq*
Non-native invasive plant species and noxious weeds located along pipeline routes and roads would be controlled by personnel appropriately licensed and approved by the USFS using methods approved by the USFS and in coordination with the Campbell County Weed and Pest Control District.	Final Environmental Impact Statement and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project
Decommissioning and Reclamation	
General Mitigation Measures	***Authority***
The Company would follow agency procedures or surface owner specifications designed to reclaim disturbed areas as close to pre-development conditions as possible.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Roads Mitigation Measures	***Authority***
Unneeded constructed roads would be blocked, re-contoured, reclaimed, and revegetated consistent with the requirements of the BLM, USFS, and the State of Wyoming.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); Onshore Order No. 1, III.G.4.(b)(2); Onshore Oil and Gas Order No. 1 – Approval of Operations on Onshore Federal and Indian Oil and Gas Leases 48 FR 48916 (1983); FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Two-track roads scheduled for decommissioning would be reclaimed by ripping or plowing and drill seeding if deemed necessary by the surface owner or USFS.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); Onshore Order No. 1, III.G.4.(b)(2); Onshore Oil and Gas Order No. 1 – Approval of Operations on Onshore Federal and Indian Oil and Gas Leases 48 FR 48916 (1983). VII.; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology
Well Site Mitigation Measures	***Authority***
Well sites would be re-contoured, plowed, and seeded consistent with the procedures described in the APD, Surface Use Program, or COAs at the request of the surface owner.	30 USC Section 226(g), Mineral Leasing Act of 1920; 43 CFR 3162.3-1(f); Onshore Oil and Gas Order No. 1 – Approval of Operations on Onshore Federal and Indian Oil and Gas Leases 48 FR 48916 (1983). VII.; FSM 2100 Environmental Management and FSM 2800 Minerals and Geology

2.4 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

Some of the issues obtained during the scoping process suggested potential alternatives to the Proposed Action. These issues have been examined and a determination has been made that:

- The suggested alternative is non-viable for reasons indicated, or
- Applicant-committed mitigation measures will eliminate or mitigate the concern.

Proposed alternatives are required to be technically and economically feasible and to provide the opportunity to achieve the Proposed Project (CEQ, Forty Questions, 2a).

A summary of alternatives considered but not analyzed in detail is indicated in **Table 2-9**.

Table 2-9 Potential Alternatives Suggested in Public Scoping

Potential Alternative	Discussion	Action
Apply best available control technology (BACT) to control dust emissions, including magnesium chloride and use of durable gravel on roads. Install air quality monitoring devices between the Project Area and the North Rochelle Mine to quantify impacts of CBM development on the mine's air quality compliance.	• Remote monitoring of wells and production facilities would minimize the frequency of required vehicular access to the Project Area. • Upgrading roads from two-track status would increase disturbance from the Proposed Action. • Project compressor emissions would meet legal standards and would be permitted as required by the WDEQ. • The mine could work cooperatively with the Forest Service to established desired air monitoring facilities to determine whether dust emissions were originating within the Project Area or within the mine area.	Considered but not analyzed and partially mitigated by applicant.

Potential Alternative	Discussion	Action
Dispose of produced water by injection into the same coal seam or another formation. This would eliminate erosion and sedimentation, adverse impacts to water quality, fish, wildlife, and plants. Injection would also reduce the risk of subsidence and aquifer depletion if injected into shallow formations.	• Injection has been found to be technically and economically unfeasible for most coalbed natural gas production (Eastern Research Group, 2002). • Injection into the producing coal seam would eliminate gas production since the coal needs to be de-watered to reduce formation pressure sufficiently to allow gas to flow to the surface. • Injection into deep formations would remove good quality water from agricultural and industrial use. • Potential deep aquifers examined for possible injection in the Project Area have been determined to be sufficiently saturated and of such low permeability that insufficient volumes of produced water could be economically and technologically handled. • Development of injection wells and associated pipelines and pumping facilities would increase surface disturbance. • Credible evidence of subsidence caused by CBM-associated water production has not been established. • The volumes of produced water associated with the Project are small compared to those from episodic storm events. • The applicant has committed to mitigative measures designed to reduce erosion effects.	Considered but not analyzed.
Reduce the need for roads and barriers to wildlife movement by clustering wells onto pads and using directional drilling.	• Directional drilling for shallow horizons such as the targets for the Proposed Action is technically unfeasible. Target depths of less than 1,000 feet do not permit deviation of the well bore sufficiently to reach distant gas reservoir locations.	Considered but not analyzed.
Recycle drilling fluids.	• Recycling of drilling fluid is not technically or economically feasible for the Proposed Action.	Considered but not analyzed.
Employ desalinization or other water treatment methods to improve the quality of produced water that would be discharged to local drainages.	• Produced water in the area of the Proposed Action is of high quality and low salinity, exceeding the quality of downstream Porcupine Creek, the principal drainage. • Sodium Adsorption Ratios are similar to those in Porcupine Creek and salinity values are significantly lower than in Porcupine Creek. • There is no reason to treat the produced water.	Considered but not analyzed.

Potential Alternative	Discussion	Action
Use alternative fuel sources to power production equipment.	• Electrical power would be used to power the down-hole water pumps. This is the most technically feasible, cost-effective, quiet, and visually unobtrusive power source. • Compressors would be gas-powered by on-site produced gas. Use of local gas eliminates the need for additional gas pipeline or high voltage electrical line construction into the area of the Proposed Action.	Considered but not analyzed.
Reduce intentional venting of produced gas.	• Produced gas is vented only until volumes reach a level capable of sustaining compression operations, at which time the well is shut in pending a pipeline connection. The proposed venting conditions are approved by the WOGCC and the BLM.	Considered but not analyzed.
Phase development over time to reduce the intensity of impacts to fish and wildlife populations and habitat.	• Development would occur over a period estimated at 16 to 18 months. • Coalbed natural gas in the Project Area is currently being lost by drainage to wells on private land and through exposed coals in adjacent surface mines. This loss represents a loss of revenue to the United States and to the Applicant. Accordingly, it is important that the Proposed Project, when approved, proceed as rapidly as is feasible.	Considered but not analyzed.
Create access opportunities to public lands and reduce human impacts by dispersing people over larger public areas.	• The limited road construction planned for the Proposed Action would consist almost entirely of short segments leading from existing roads to wells or production facilities. There would be no new access to public lands. • Creating additional public access to public lands is beyond the scope of the Proposed Action.	Considered but not analyzed.
Develop and implement an inspection and enforcement program.	• Quality of discharged produced water and compressor emissions would be periodically monitored and reported through the WDEQ.	Considered but not analyzed.
Develop adequate buffer zones to protect wildlife habitat during construction and ongoing operations. Exclude well sites from crucial winter range.	• To the extent feasible, the Proposed Action locates access routes and utilities within common corridors to reduce disturbance to existing wildlife habitat. • Long-term (project life) disturbance to the Project Area would involve approximately 1 percent of the total acreage. • More than 10 percent of well sites or access corridors under the Proposed Action Alternative have been relocated, principally in response to wildlife issues, following consultations with the USFS and BLM. • Crucial winter range habitat has not been identified in the Project Area.	Considered and mitigated by applicant.

Potential Alternative	Discussion	Action
Consider 80-acre well spacing as an alternative to 40-acre spacing and reduce numbers of wells to minimize impact to North Rochelle surface coal mine.	• In the area of the North Rochelle Mine, 80-acre spacing has been adopted and several wells located adjacent to the mine's facilities have been removed from the Proposed Action. • The number of well sites has been reduced consistent with the need for the Proponent to develop its mineral resources.	Considered and mitigated by applicant.
Power compressors with natural gas and equip compressors with high quality mufflers to minimize noise levels.	• Specified in the Proposed Action.	Considered and mitigated by applicant.
Consider requiring wireless monitoring of all wells.	• Specified in the Proposed Action.	Considered and mitigated by applicant.
Potential noxious weed growth needs to be controlled. Disturbed areas need to be reclaimed with native soil and plants immediately after cessation of operations.	• Specified in the Proposed Action. • Reclamation efforts and seeding would be using procedures approved by the USFS and BLM.	Considered and mitigated by applicant.
Use produced water to enhance fish and wildlife habitats.	• Produced water would be beneficially used for livestock and wildlife watering. • There are no water bodies within the Project Area that support fish populations.	Considered and mitigated by applicant.

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